

## CLAIMS

1. A regeneration controller for eliminating particulate matter accumulated in an exhaust purification apparatus in an exhaust system of an internal combustion engine, in which exhaust having an air-fuel ratio passes through the exhaust system during engine operation, wherein the exhaust apparatus includes catalyst, the regeneration controller comprising:

a heating section for heating the exhaust purification apparatus and eliminating the particulate matter accumulated in the exhaust purification apparatus when an estimated accumulation amount is greater than a reference accumulation amount, the heating section obtaining the estimated accumulation amount by estimating the amount of particulate matter accumulated in the exhaust purification apparatus;

a temperature detector for detecting temperature of the exhaust purification apparatus;

a control section for intermittently decreasing the air-fuel ratio of the exhaust to heat the exhaust purification apparatus and perform burn-up heating for burning the particulate matter; and

a prohibition section for prohibiting burn-up heating when the temperature detected by the temperature detector decreases to a catalyst inactivation level.

2. A regeneration controller for eliminating particulate matter accumulated in an exhaust purification apparatus in an exhaust system of an internal combustion engine, in which exhaust having an air-fuel ratio passes through the exhaust system during engine operation, wherein the exhaust apparatus includes catalyst, the regeneration controller comprising:

a heating section for heating the exhaust purification

apparatus and eliminating the particulate matter accumulated in the exhaust purification apparatus when an estimated accumulation amount is greater than a reference accumulation amount, the heating section obtaining the estimated

5 accumulation amount by estimating the amount of particulate matter accumulated in the exhaust purification apparatus;

a temperature detector for detecting temperature of the exhaust purification apparatus;

10 a control section for intermittently decreasing the air-fuel ratio of the exhaust to heat the exhaust purification apparatus and perform burn-up heating for burning the particulate matter; and

a prohibition section for prohibiting burn-up heating when the period during which the temperature detected by the  
15 temperature detector is lower than a catalyst inactivation level is longer than a prohibition determination reference period.

3. The regeneration controller according to claim 1  
20 or 2, wherein the control section executes burn-up heating when the estimated accumulation amount is within a predetermined burn-up execution range.

4. The regeneration controller according to claim  
25 3, wherein the burn-up execution range is set in accordance with a relatively small estimated accumulation amount, and the heating section heats the exhaust purification apparatus by continuously lowering the air-fuel ratio of the exhaust to perform normal heating when the estimated accumulation  
30 amount is greater than the reference accumulation amount and excluded from the burn-up execution range.

5. The regeneration controller according to claim 4, wherein the heating section performs normal heating when

the prohibition section prohibits burn-up heating.

6. The regeneration controller according to any one of claims 1 to 5, wherein:

- 5 the exhaust purification apparatus includes a first exhaust purification mechanism arranged in the exhaust system and a second exhaust purification apparatus arranged downstream from the first exhaust purification apparatus; and
- 10 the temperature detector detects as the temperature of the exhaust purification apparatus at least one of the exhaust temperature between the first and second exhaust purification mechanisms and the exhaust temperature at a downstream side of the second exhaust purification
- 15 mechanism.

7. The regeneration controller according to any one of claims 1 to 5, wherein the temperature detector detects as the temperature of the exhaust purification apparatus at

20 least one of the temperature at an intermediate portion of the exhaust purification apparatus and the exhaust temperature at a downstream side of the exhaust purification apparatus.

25 8. A method for eliminating particulate matter accumulated in an exhaust purification apparatus in an exhaust system of an internal combustion engine, in which exhaust having an air-fuel ratio passes through the exhaust system during engine operation, the method comprising:

30 heating the exhaust purification apparatus by intermittently decreasing the air-fuel ratio of the exhaust to perform burn-up heating for burning the particulate matter;

detecting temperature of the exhaust purification

apparatus; and

prohibiting burn-up heating based on the detected temperature.

5           9.     The method according to claim 8, wherein said prohibiting burn-up heating includes prohibiting burn-up heating when the detected temperature is less than or equal to a predetermined temperature.

10           10.    The method according to claim 8, wherein said prohibiting burn-up heating includes prohibiting burn-up heating based on a period during which the detected temperature is less than or equal to a predetermined temperature.

15           11.    The method according to any one of claims 8 to 10, wherein said detecting temperature of the exhaust purification apparatus includes detecting temperature of the exhaust flowing through the exhaust purification apparatus.